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Effects of Climate Change on Russia's Arctic Security Posture

Climate change impacts Russia's Arctic security posture from the broad strategic level down to the smallest logistical considerations. A warming and more accessible Arctic provided much of the original impetus to militarize the region. Russia's so-called protective dome is built through refurbishments of Cold War military installations, new bases, dual-use search and rescue centers, use of Russian special forces, and Arctic-specific kit. The Russian military—with Minister of Defense Sergei Shoigu and Secretary of the Security Council Nikolai Patrushev as its primary patrons—has continued to drive budget increases dedicated to the Arctic, reorganization of these forces (including the creation of an Arctic Strategic Command and the designation of the Northern Fleet as its own military district), and strategic and doctrinal developments. However, there has not been a discernible effort at better understanding climate-related impacts on Russia's military posture, especially with respect to infrastructure and military installations, where a culture of cost- and corner-cutting predominates, as does corruption. Once again, Russian decisionmakers prioritize the perceived benefits of climate change without acknowledging its future costs—especially as many military installations are located in vulnerable climate hot spots.

Climate Change at the Conceptual and Strategic Level

Similar to the Russian government's slow acknowledgement of the implications of climate change on its future economic prosperity, there has also been a slow recognition of the effects of climate change

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in Moscow's security and defense policy. This evolution can be seen in the language in recent Russian security strategies referring to climate. The 2015 National Security Strategy only referenced climate change in passing and merely noted that it is "connected" to certain consequences such as natural disasters.[128] The July 2021 National Security Strategy, on the other hand, specifically discusses climate change as a security threat requiring prevention, adaptation, and international cooperation.[129] The shift appears to re-prioritize climate change as not merely a complicating variable, but as a higher-order challenge the national security apparatus must consider.[130] Notably, the document also pulls from the same language of Russian economic strategies that claim global (or Western) efforts to mitigate climate change are an excuse to contain the Russian energy industry, its exports, and its control over transport routes.[131] It also links the development of low-carbon economies to a race for resources that will fuel tensions and possibly even the emergence of conflict, providing justification for continued militarization of the Arctic.[132]

Climate change, the retreat of sea ice, and the prospect of a more readily navigable Arctic effectively creates a new coastal border that Russia must defend. Russia's defensive priorities are to protect its second-strike nuclear assets in the Kola Peninsula (in the western Arctic) and its critical economic interests, particularly the oil and gas projects on the Yamal Peninsula and the NSR (in the central to eastern Arctic).[133] The latter is notable due to the legal uncertainty around the route: Moscow asserts the NSR is an internal passageway and that the UN Convention on the Law of the Sea's requirements for international passages do not apply. It also uses Article 234 of the convention—which allows states to enhance their control of ice-covered waters in their exclusive economic zone—to require vessels passing through to have a Russian pilot, charge toll fees, and demand advanced warning for foreign vessels planning to use the route.[134] Moscow is concerned that the United States and NATO will use climate change to facilitate and justify increased Western presence in the region, which they could eventually use to challenge Russia's legal stance on the NSR.[135] The effects of climate change amplify this concern: as the NSR becomes increasingly ice-free, it is not clear how much longer Russia will be able to justify its restrictions under Article 234, which only applies to areas that are ice-covered for "most of the year."[136]

While these real and perceived threats drive much of Russia's military posture in the Arctic, its actual activity exceeds its defense mandate. Through the advancement and modernization of its ballistic missile submarine (SSBN) deterrent, testing of new hypersonic and nuclear-powered cruise missiles, and the likely development of the Poseidon nuclear undersea drone based in the Arctic, Russia's military posture in the Arctic also enhances its offensive capabilities.[137] Geographically, the Arctic (or the new "commanding heights," as the Chinese strategic community increasingly refers to the region) shortens the distance between Russian missiles and submarines in its Far North to European and North American targets.[138] Russia's modernized SSBNs more frequently traverse the Greenland-Iceland-United Kingdom (GIUK) Gap into the North Atlantic Ocean, which could challenge NATO's sea lines of communication (including economically vital transatlantic undersea cables) and prevent U.S. and Canadian reinforcement and resupply of European allies. Russia also exploits the blurred delineation between offensive and defensive capabilities.[139] For example, fighter jets are increasingly stationed at bases such as Russia's northernmost military installation: Nagurskoye air base on Franz Josef Land. They are ostensibly deployed to help the Northern Fleet intercept threats to Russia's Far North, but, especially when paired with air-to-air refueling capabilities (which Russia tests frequently) and new hypersonic cruise missiles, they may have sufficient range to threaten U.S. air bases in Greenland and North American targets.[140]

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The prestige of the growing array of new Russian military capabilities on display in the Arctic may increase the leverage of the military-industrial complex in domestic competition for influence and favor and enhance its ability to request increased funding for new military capabilities.[141] This could challenge the Russian extractive industry lobby; as Russian expert Marlene Laruelle notes: "Tensions between economic and security considerations . . . are particularly visible for the Arctic region."[142] The central government has tried on occasion to split the difference between these camps and bridge together the regional military-industrial complex. Granting primary administration of the NSR to the state-owned corporation Rosatom can be viewed as an example of this: it allows a corporation to pursue economic gain while maintaining firm state control over the route for national security purposes.

Climate Change and the Militarization of the Russian Arctic

Russia's Far North military buildup centers primarily around the Northern Fleet and the refurbishment of Soviet-era military installations. Its militarization is quite different in its eastern Arctic, where it focuses primarily on situational awareness by deploying radar systems to its regional bases, such as the Sopka-2 radar systems on Wrangel Island and Cape Schmidt.[143] Showcasing Russia's dual-use approach to the region, these systems also provide meteorological data to civilian vessels traveling from the Asia-Pacific and entering the NSR through the Bering Strait. In the central Arctic, and even more so further west toward the highly militarized Kola Peninsula, Russia's capabilities become increasingly advanced, lethal, and offensive in nature. These include air defense systems such as the S-400 and S-300, Bastion-P, and Pantsir-S1 systems, as well as the Arctic Brigade, which was formed in 2015 with a mission to secure Russia's Arctic coastline and infrastructure and to assist with escorting ships along the NSR. It is housed on the Kola Peninsula.[144]

Russia's western Arctic is home to its Northern Fleet, the centerpiece of Moscow's regional force posture. Headquartered at Severomorsk, it was elevated to a joint strategic command in 2014. In January 2021, Putin upgraded it to one of five military districts, an unprecedented assignment for a fleet.[145] It retains its mission of guarding Russia's sea-based strategic nuclear deterrent, but its new status reflects the enhanced role it plays in patrolling Russia's northern coastline, safeguarding shipping on the NSR, and overseeing the refurbishment of Soviet-era military installations. It hosts a significant array of military assets: "nuclear-powered missile and torpedo submarines; missile-carrying and anti-submarine aircraft; surface ships with missiles, aircraft-carrying, and anti-submarine capabilities; coastal troops; combined independent force; the Russian Air Force and Air Defense Force; and the army corps of the Ground Forces."[146]

The Northern Fleet continues to substantially modernize, including with the launch of two of four Borei-class SSBNs.[147] Although it was originally planned that the next three Borei SSBNs would all go to the Pacific Fleet, the Ministry of Defence altered those plans to instead send one to the Northern Fleet.[148] This demonstrates the growing success of Arctic military commands in advocating for their needs. In June 2021, the Northern Fleet also received the first of the dangerous Yasen-M-class strategic guided-missile submarines (SSGNs); it will receive three more, as will the Pacific Fleet.[149] While this will improve the Northern Fleet's capability, it continues to struggle with aging capabilities, it lacks air mobility assets, and the majority of its current capabilities are not Arctic-specific. Russia's military icebreaking program has encountered substantial delays; the Northern Fleet has only one icebreaker and no other ice-class platforms.[150]

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Russia is refurbishing or expanding Soviet-era military posts, including "13 air bases, 10 radar stations, 20 border outposts, and 10 integrated emergency rescue stations."[151] The air bases and radar installations are equipped with fighter jets, bombers, radar systems, missile defense systems, such as the S-400, and electronic warfare equipment, among other capabilities.[152] Russia also has launched remote sensing and communications satellites to cover its polar regions and plans to bring more online by 2024.[153] The radars and satellites increase capacity for early warning, monitoring, and operational awareness. The fighter jets, bombers, and missile systems boost interdiction capabilities and expand strategic depth by creating a dense, if not impenetrable, anti-access/area denial (A2/AD) bubble. The development of this strategic depth, the core of its bastion defense concept, has been a particular priority.[154] Most of these facilities are dual-use in nature and include coast guard units and search and rescue capabilities (Russia's coast guard service is part of its FSB).[155] In addition, Russia also has ambitious plans to build 10 integrated Emergency Rescue Centers along the NSR, though there have been delays in construction.[156]

It appears that Russia has decided to end constructing military infrastructure at new sites in the region in favor of strengthening and hardening what they have already built.[157] This may be to factor for cost and climate change implications, although the need for new infrastructure may become overwhelming as there are increasing indications that Russia could require more military and coast guard infrastructure in the eastern Arctic and near the Bering Strait to support new fishing areas in the Chukchi Sea.[158] This may also be needed to address increased shipping activity (particularly LNG carriers) into the NSR's eastern entry point in the Bering Strait. Both will necessitate an increased coast guard presence for search and rescue and to prevent illegal, unreported, and unregulated (IUU) fishing. It is important to note that Russian military activity in the Bering Sea is limited, but an unprecedented military exercise in the summer of 2020 may indicate a shift, suggesting these developments may presage additional military activity in Russia's eastern Arctic, which has been rare thus far.[159] It would, however, be consistent with an uptick in Russian long-range bombing flights near and around Alaska over the past several years.[160]

The Russian military also adjusts to a changing region by developing and procuring Arctic-specific capabilities, designed to withstand a harsh Arctic environment made even more unpredictable by climate change. Russian weapons and accompanying systems are either already hardened for Arctic use or are developed with extreme cold-weather conditions in mind. For example, the Northern Fleet has developed a new suite of drones designed and tested to survive extreme weather.[161] These include the Gorizont, Forpost, and Orlan-10 unmanned aerial vehicles (UAVs), as well as the new solar-powered Sova drone, which are primarily used for intelligence, surveillance, and reconnaissance (ISR) but may also assist with air guidance and artillery fire adjustments.[162] The Arctic Brigade has also procured armed personnel carriers and all-terrain vehicles adapted to cold-weather conditions.[163] What is not clear is how or if Russia is adjusting to address how warming, changing salinity, and acidification in Arctic waters could complicate undersea acoustics and therefore its submarine activity.[164]

Another feature of Russia's Arctic militarization is its constant testing and application of its new capabilities. This has included a substantial uptick in exercises, training, and missile tests. An illustrative list from just March to July 2021 alone includes: a large naval exercise led by the Northern Fleet; training for raiding operations near the Norwegian and Finnish border; artillery shelling in the Barents Sea; command and staff training at Northern Fleet Headquarters; and

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submarine drills off Franz Josef Land Island.[165] The Northern Fleet is also participating in the Zapad 2021 exercise in September 2021.[166] Russia also increasingly tests its new hypersonic missiles in the Arctic, including the Tsirkon cruise missile and the Kinzhal ballistic missile.[167] Finally, long-range bomber flights of the region are also increasingly common.

Climate Impacts on Russian Military Installations

In addition to influencing Russia's Arctic force posture, mission set, and procurement plans, climate change has had and will continue to have a direct impact on Russia's new and Soviet-era Arctic military installations. This is a particular challenge for the Northern Fleet, which must cover a massive territory from its headquarters in Sevoromorsk. To begin to address this challenge, the Northern Fleet recently created a naval engineering brigade, an unorthodox unit that will tackle a broad array of missions, including bridge and pontoon laying, countermining, and assault on reinforced positions—but also construction and restoration of Arctic infrastructure facilities.[168] The creation of this unit, the competency of which was likely tested in Zapad 2021, demonstrates an understanding within the Russian Ministry of Defence of the potential impacts of climate change on Arctic installations.[169] This "climate change first responder unit" will hand yet another responsibility to an already overstretched Northern Fleet.[170] (The Northern Fleet already takes on responsibilities for what are normally civilian tasks, such as "protecting Russia's exclusive economic zone [EEZ] from illegal activities and environmental dangers, and ensuring safety of navigation."[171]) This expansion will also stretch the FSB's coast guard responsibilities to keep pace with more frequent and northerly commercial activity. Addressing the impacts of climate change will certainly add additional tasks for the Russian military in its Arctic region.

MILITARY INSTALLATIONS IN CLIMATE HOT SPOTS

An increasing number of environmental and climate-induced incidents occur near Russian military installations, including permafrost thaw, coastal erosion, wildfires, and extreme weather events. For example, the 22,000 tons of diesel oil spilled at Norilsk occurred not far from the Alykel airfield and Dudinka coast guard base.

The primary vulnerability to Russian military installations is permafrost thaw. Eighteen Russian Arctic military bases, ports, or search and rescue centers are situated in continuous, discontinuous, or sporadic permafrost zones.[172] There are five Russian military installations in or near permafrost hot spots—areas where infrastructure is at medium-high or high risk of significant degradation by 2050 because of permafrost thaw. Beginning in Russia's western Arctic and going east, they are as follows: Naryan-Mar air base, Rogachevo air base, Vorkuta air base, Provhideniya airfield, and Anadyr-Ugolny air base. Amderma airfield would be a sixth, but it has been abandoned and severely damaged by permafrost thaw already, and the Ministry of Defence's plans to rebuild it do not seem to have come to fruition.

Six more military and economically important locations appear to be at moderate risk: the port at Sabetta, critical for protecting Yamal energy infrastructure; the search and rescue center at Nadym; Alykel airfield, near the city of Norilsk, the site of the 2020 oil spill; Tiksi air base; Chokurdakh airfield; and Chersky airfield. (The heavily militarized Kola Peninsula, home of the Northern Fleet, Arctic Brigade, and Russia's strategic submarine fleet, is largely permafrost-free, as is Franz Josef Land Island, home of Nagurskoye air base.[173])

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Permafrost Degradation at and near Abandoned Amderma Airfield

These images from July 2010 show the effects of permafrost deterioration on structures at Amderma airfield and ground collapse in the land nearby. Photos courtesy of Gerald V. Frost.

Some of these locations are more militarily significant than others. Of the five most endangered sites, two stand out. The first is Rogachevo, a significant air base on a southern island of the Novaya Zemlya archipelago that hosts crucial missile defense assets: S-400 and S-300 air defense systems, Pantsir-S1 anti-aircraft systems, Rubezh anti-ship coastal systems, and P-800 Oniks systems.[174] In 2018 and 2019, the air base was upgraded with "additional radar, electronic warfare (EW), signals intelligence forces, and related equipment."[175] Even more recently, at the air base east of the missile defense installation, Russia appeared to be deploying long-range MiG-31 BM interceptors. An adverse permafrost-related incident at Rogachevo, especially near the missile defense base, would have to be addressed quickly to ensure the strength of Russia's multilayered A2/AD strategy. Anadyr-Ugolny is notable as well. One of the few large installations in Russia's eastern Arctic, it supports a broad mission set: search and rescue, electronic warfare, drone operations, long-range patrols by Tu-22M3 strategic bombers, and satellite communications.[176] Should Anadyr-Ugolny require further development to support Russia's possible increased military activity in the Bering and Chukchi Seas, new construction could be hampered by climate change.

Of the moderately endangered sites, the port of Sabetta is of great interest as it has become the "nerve center" of three of Yamal's largest projects.[177] Construction on this dual-use port began in 2013; from the start, it was intended to serve Russia's Yamal oil and gas projects and be a major hub on the NSR.

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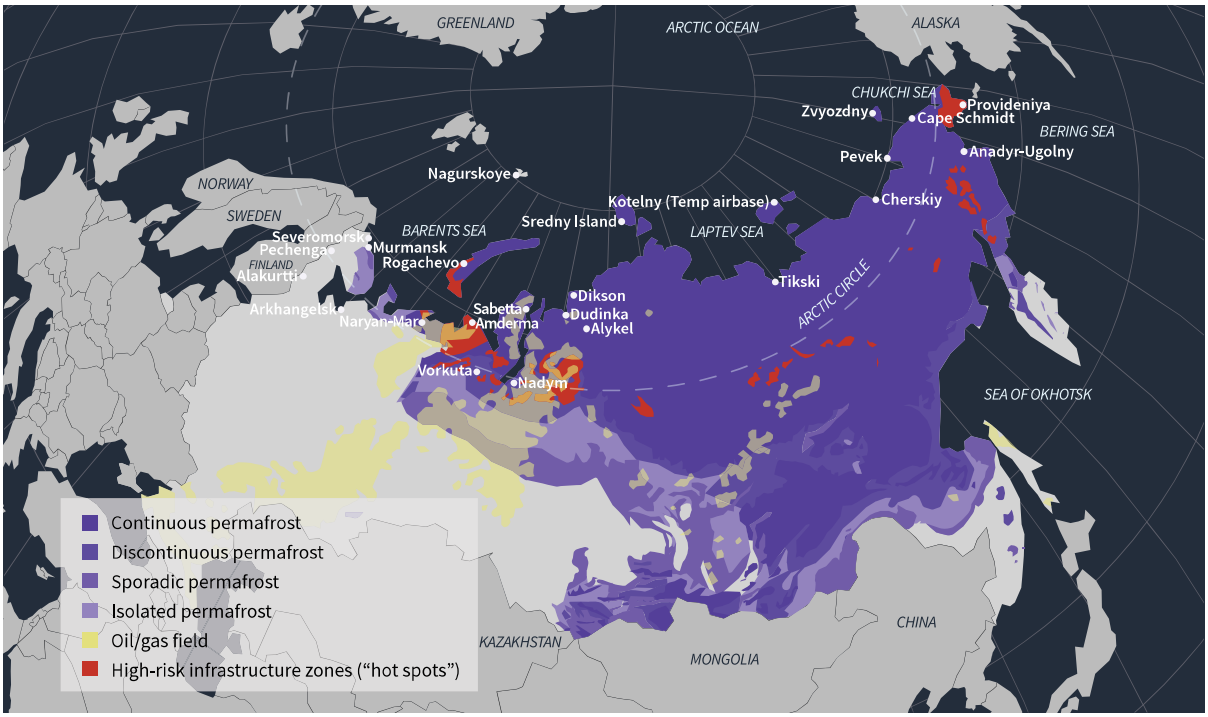
Permafrost Hot Spots and Military Installations



Source: Map data comes from Bennett, "Norilsk oil spill: 'There are rivers of fuel'"; and Hjort et al., "Degrading permafrost puts Arctic infrastructure at risk by mid-century."

The Russian national guard ("Rosgvardia"), a military force established in 2016 directly answerable to Putin, was recently assigned responsibility for protecting the port.[178] While not at particularly high risk of permafrost-related degradation, there is an airfield at the site, and it is used for search and rescue as well. Given these multiple uses and the centrality of the Yamal projects in Russia's regional development strategy, potential permafrost degradation or coastal erosion at the port of Sabetta is undoubtedly of high concern to the Russian Ministry of Defence. Tiksi air base in central-eastern Russia is also worth noting, though not because of its military significance per se. In fact, despite ambitious plans to upgrade the base with an S-400 system and port improvements, Russia has not yet delivered on these plans, although Tiksi does have the less advanced S-300 system.[179] This may indicate financial limitations, but it may also indicate reluctance to station essential air defense assets and NSR infrastructure on a permafrost hot spot, or some combination of the two.

Sea level rise and coastal erosion will continue to pose challenges to Russia's military installations along its Arctic coasts. More than a decade ago, a 2009 report from the National Intelligence Council cited the port city of Murmansk as at elevated risk of flooding, but it is unlikely to affect the Northern Fleet naval stations as they are built 20 meters above sea level and inland on stable bedrock along the inlets, as opposed to in the more erodible dirt by the sea.[180] However, Russia's shipbuilding yards near the city of Arkhangelsk may be at some risk, according to congressional testimony from a senior naval intelligence manager of the Office of Naval Intelligence.[181] The Sevmash shipyard at Severodvinsk is the only yard in Russia that builds nuclear submarines—such as the recent Yasen-M-class SSGN delivered to the Northern Fleet in June 2021, as well as the seven to follow—and could potentially be impacted, as could the 10 emergency search and rescue centers along the NSR.[182]

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Quality of Russian Military Infrastructure

In addition to climate impacts, the quality and materials of Russian military infrastructure also affects the likelihood of degradation. A number of variables are germane: availability of financial resources, age of the infrastructure, engineering practices, building components, culture of reporting potential flaws, and corruption. Russia's relative deficiencies in these areas may increase the danger to its military installations.

Russia's new Arctic military infrastructure is largely built on former Soviet sites. Most have retained the original Soviet infrastructure but modernized, refurbished, or expanded upon it. Others use former Soviet-era sites but have built entirely new hangars, airstrips, and infrastructure, such as Nagurskoye air base, a facility which also received one of Russia's state-of-the-art Trefoil bases.[183] The reason behind this may be a cost-saving measure: it is cheaper to rebuild than to build anew.[184] However, the original Soviet sites were of course chosen before the extent of issues such as permafrost thaw and coastal erosion were understood.

Limits to Russian defense spending and the need to prioritize creates a hierarchy of sorts in the Russian Arctic. Nuclear and strategic facilities on the Kola Peninsula and in Arkhangelsk, as well as the Pacific Fleet at Kamchatka, are prioritized, followed by military installations near critical energy infrastructure, and then the remainder of the Russian Arctic Zone.[185] This final, disadvantaged category includes the vast majority of the bases highlighted in this section, which may help explain, for example, why construction at Tiksi air base has so lagged behind Russia's stated plans.

A culture of cutting corners and endemic corruption in the Russian military likely exacerbates the challenge of limited resources.[186] Arctic bases often receive substandard, "off-the-shelf" materials—even Nagurskoye, which the Russian government was eager to show to the world once construction concluded.[187] They likely make do with dual-use, "civilian-plus" materials that were not designed for use in the Arctic, much less to survive permafrost thaw, coastal erosion, sea level rise, and wildfires and extreme weather events that are becoming more common.[188] (This is consistent with the Russian engineering practice of prioritizing low initial capital expenditure initially while bearing the burden of operating costs latter. Those operating costs are now likely becoming burdensome.)

Russian structural engineers, who are very capable, may distribute quality specifications, and military leaders would like the best materials, but between the award of project funding and delivery, there may often be multiple rounds of kickbacks and bribes as vested interests and lobbying groups take their cut. By the time materials reach the ground at Arctic military installations, they may often be substandard.[189] This is not a unique phenomenon to the Arctic and is consistent with broader trends of corruption in the Russian armed forces.[190] While the scope of the problem in the Arctic is not clear, the margin of error and the consequences of failure are higher at remote bases, where conditions are harsh, supply lines are long, and senior officials may not frequently visit. The problem also goes the other direction: in Russia's vertical power structures, one is not incentivized to report potential structural vulnerabilities or incipient incidents up the chain.[191] While not a military installation, this issue may have played a role in the Norilsk storage tank spill: the facility had been in violation of regulations at least two years before the spill, so a lack of routine maintenance may have caused it—not permafrost thaw, as was initially suspected.[192]

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U.S. Arctic Bases: Comparisons and Lessons Learned

There are many unknowns about climate impacts on Russian military installations. There is no incentive for the Russian government to be forthcoming about its weaknesses and mitigation efforts. But these challenges are not unique to Russia, and it is possible to draw lessons by comparing this experience with how the U.S. Department of Defense (DOD) addresses similar challenges in Alaska or at Thule Air Force Base in northern Greenland—although it is important to highlight that Alaskan and Russian permafrost conditions are not precisely the same (Russia is more ice-rich). However, there are enough similarities to make some tentative comparisons worthwhile.[193]

Four of Alaska's major military installations, two of which are located in discontinuous permafrost zones, also face challenges related to climate change. At Eielson Air Force Base, permafrost thaw caused the foundation of a munitions repair facility to gradually shift, cracks in the walls to appear, and heavy blast-proof doors containing a repair bay for missiles and explosives to become misaligned and dangerously unable to close—all before the facility itself began sliding slowly down the hill on which it was built.[194] After trying and failing to fill cracks in the melting ground, base personnel ultimately decided to demolish the building and build a new one using stabilizing, 100-foot-deep steel pilings at a price tag of $15.5 million.[195] Overall, the Air Force has had to spend $164 million for new construction on or around the permafrost, much of which is to prepare for the arrival of two F-35 squadrons. This represents a point of comparison with Russia, which also seeks to deploy fighter aircraft to Arctic military installations in permafrost zones. This includes Rogachevo air base, where, according to satellite imagery obtained by CSIS, the requisite facilities to host more fighter jets have not yet been constructed.[196] It is feasible that the Russian air force is staring down a similar price tag at this and other bases (Tiksi, for example).

The second is Clear Air Force Station, an early-warning radar site in a forested region of Alaska that is threatened by an increase in wildfires: the proximity of the forest allows fires to easily approach the installation.[197] There are many Russian Arctic and Siberian bases at similar risk, depending on whether they are surrounded primarily by brush or trees. These include the Kola Peninsula installations at Alakurtti (one of the two bases that host Russia's Arctic Brigade), Manchegorsk, and Olengorsk.[198] While most of the 2021 season of wildfires are burning in Siberia, fires in Kola are not unheard of, to include a 2018 fire just 75 kilometers west from Alakurtti.[199]

Two other endangered Alaskan bases are the Air Force and Army Joint Base Elmendorf-Richardson and Fort Greely, the Army's ground-based missile defense installation. The former is vulnerable to both wildfires and flooding and the latter to potential damage from thawing permafrost, which is endangering critical missile defense assets.[200] Moreover, the U.S. Air Force struggles to develop base designs, solve the problem of fuel supply chains, and find materials that can withstand high degrees of wind and cold in an increasingly harsh environment.[201] Although the Russian Ministry of Defence is not likely to be so transparent about its challenges, these examples illustrate that nearly every Arctic base is vulnerable to climate change–related difficulties and threats.

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